NAME- yaman

SRN –

PES2UG21CS619

SECTION -I

1. Consider page references,

0,3,4,1,2,5,7,6,0,3,1,11,5,15,9,4,0,4,

3 Cache size= 8

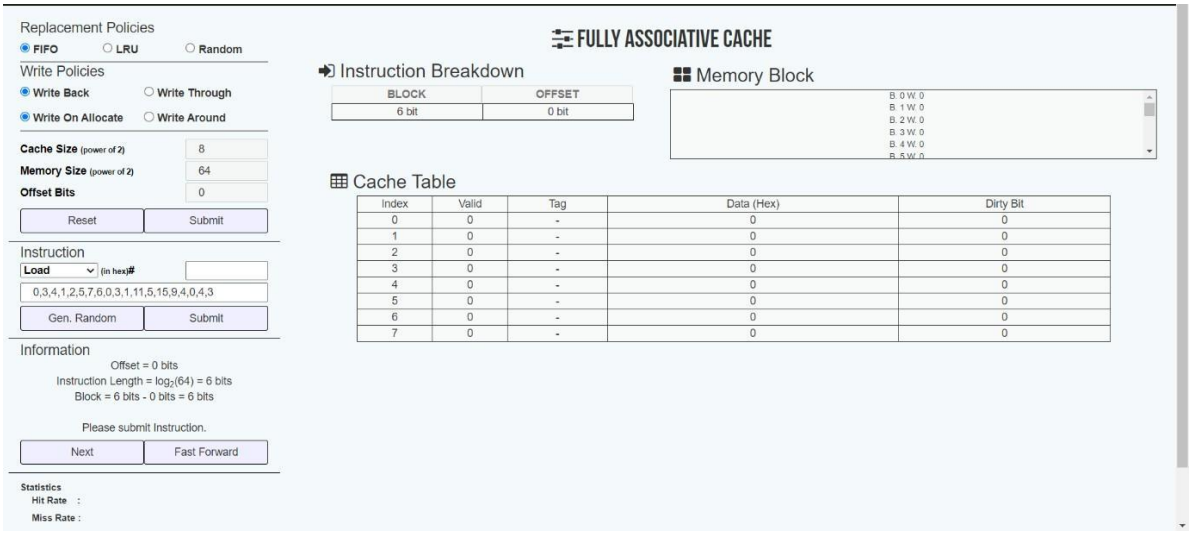
Mainmemory= 64

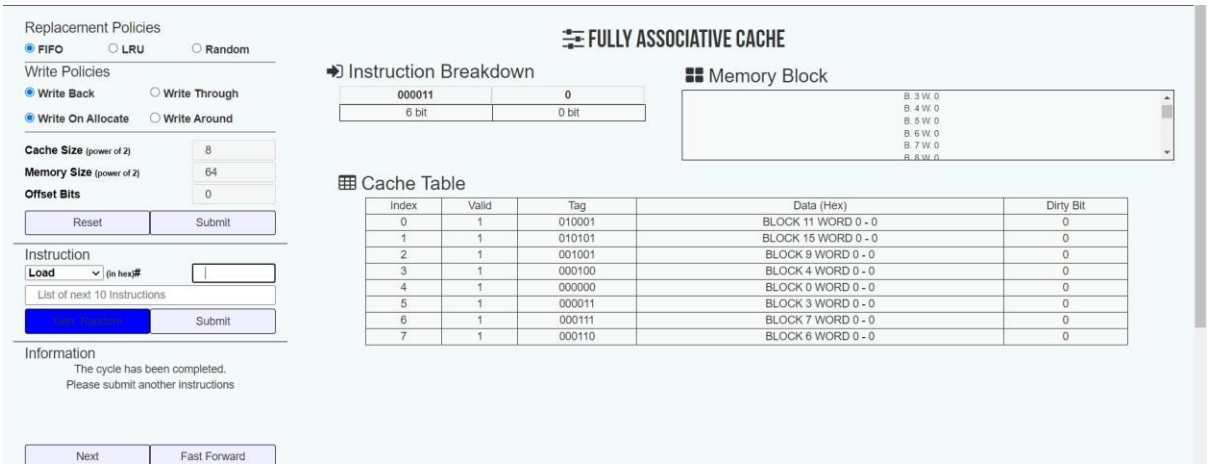
Offset/word=0

Calculate the hit ratio and miss ratio for the given references using direct mapping and fully associative FIFO and 2 way set associative FIFO.

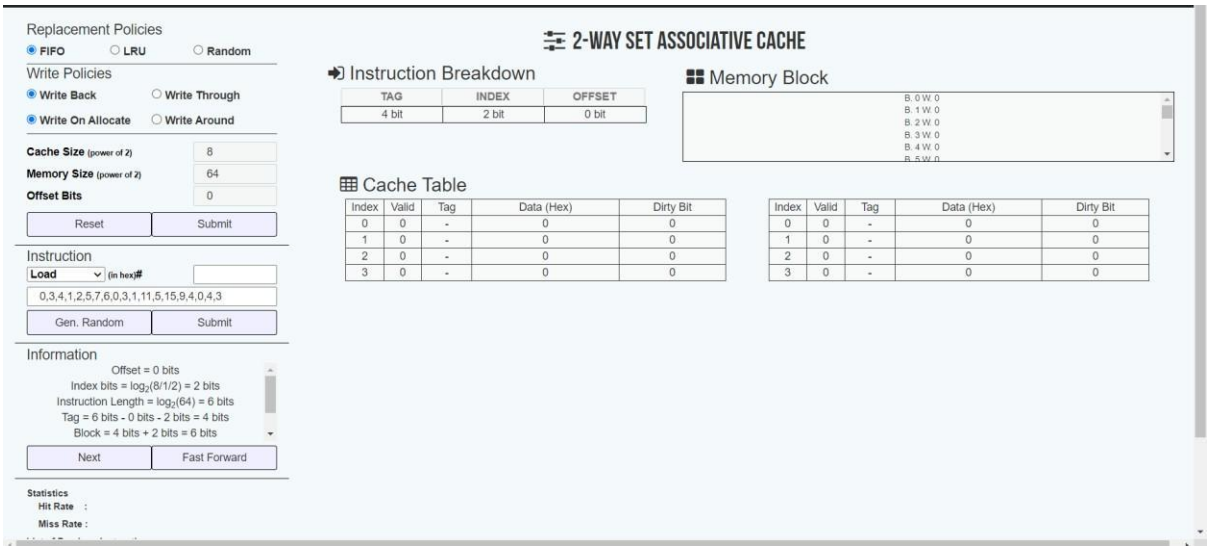
ANSWER-

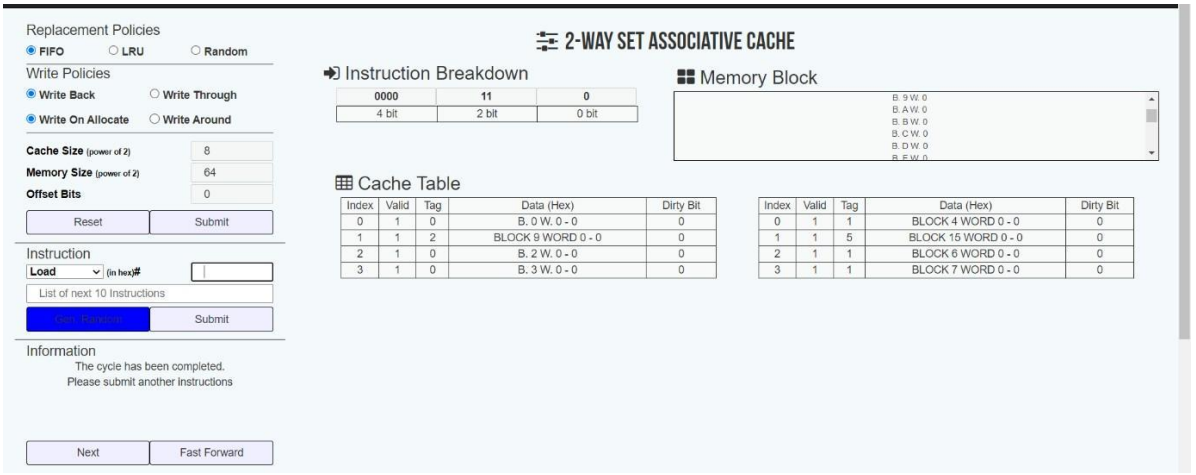
FULLY ASSOCIATIVE



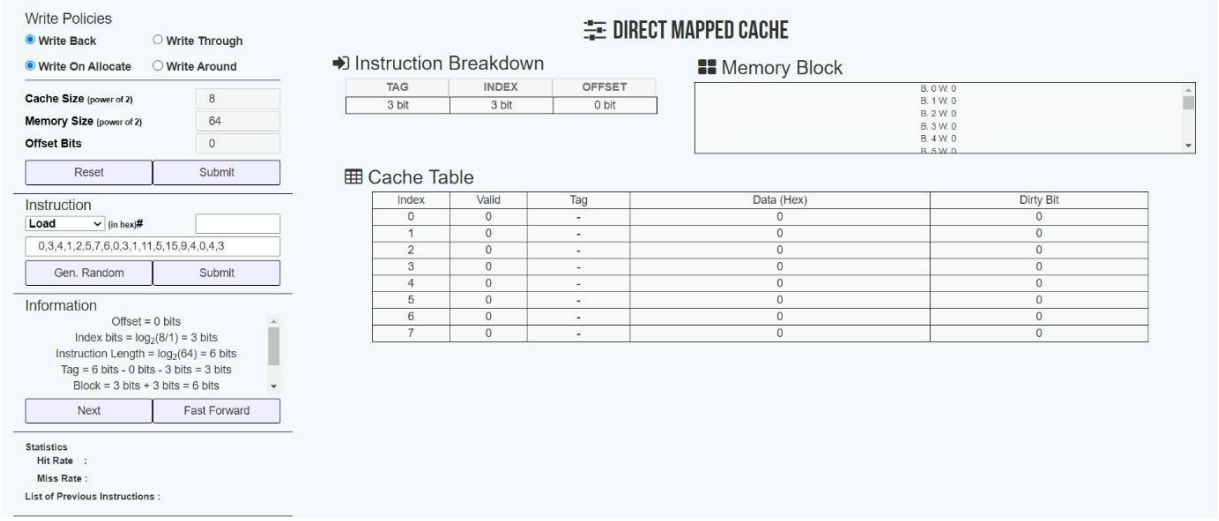


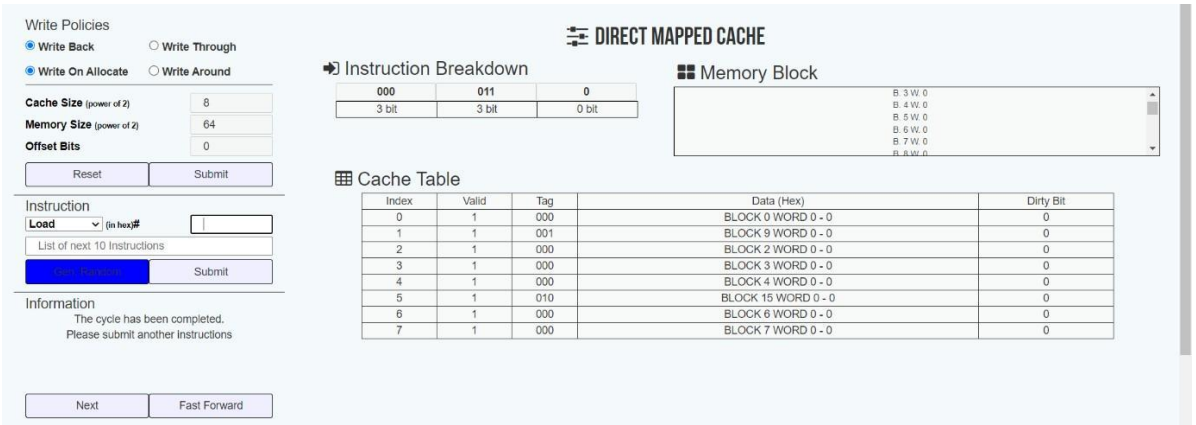
2-WAY SET ASSOCIATIVE

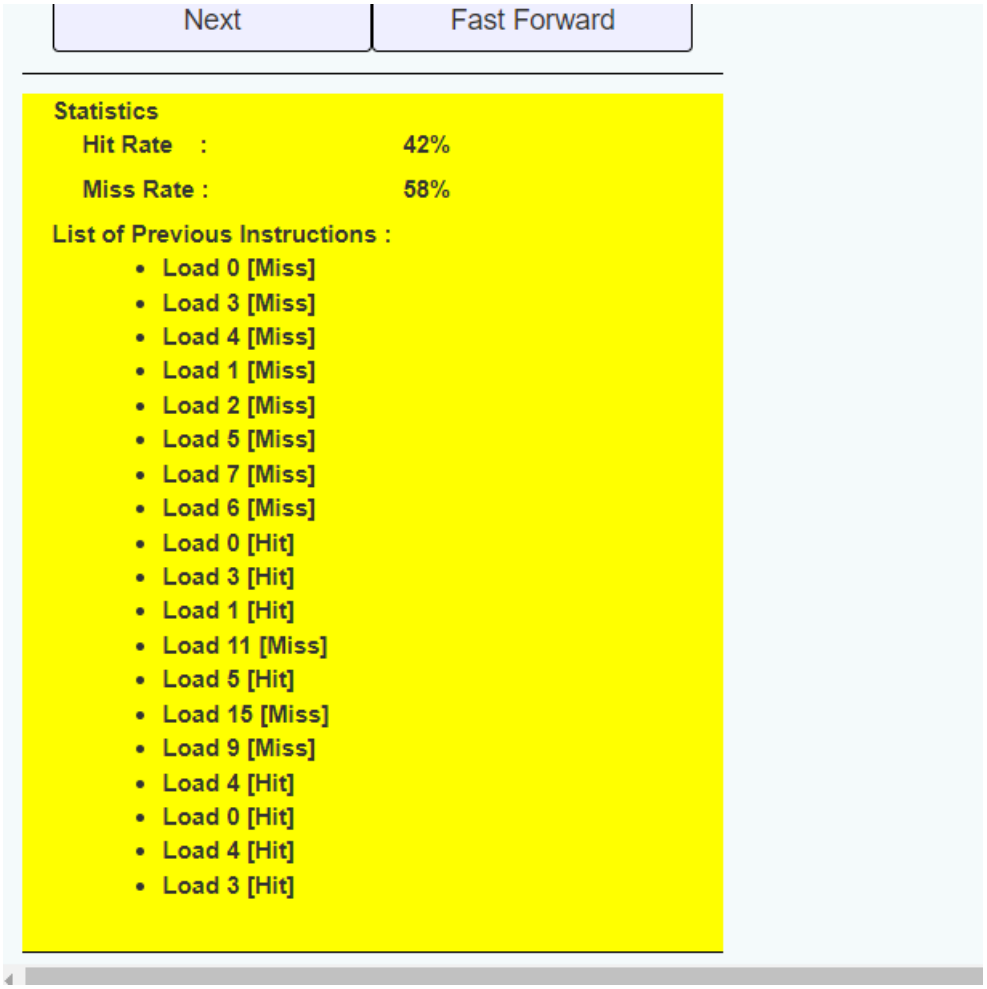

Replacement Policies
FIFO
LRU
Random
Write Policies
Write Back
Write Through
Write On Allocate
Write Around
Cache Size (power of 2)
8
Memory Size (power of 2)
64
Offset Bits
0
Reset
Submit
Instruction
Load
(in hex)#
0,3,4,1,2,5,7,6,0,3,1,11,5,15,9,4,0,4,3
Gen. Random
Submit
Information
Offset = 0 bits
Index bits = log2(8/1/2) = 2 bits
Instruction Length = log2(64) = 6 bits
Tag = 6 bits - 0 bits - 2 bits = 4 bits
Block = 4 bits + 2 bits = 6 bits
Next
Fast Forward
Statistics
Hit Rate :
Miss Rate :
2-WAY SET ASSOCIATIVE CACHE
Instruction Breakdown
TAG
INDEX
OFFSET
4 bit
2 bit
0 bit
Memory Block
B. 0 W. 0
B. 1 W. 0
B. 2 W. 0
B. 3 W. 0
B. 4 W. 0
Cache Table
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 0 - 0 0
1 0 - 0 0
2 0 - 0 0
3 0 - 0 0
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 0 - 0 0
1 0 - 0 0
2 0 - 0 0
3 0 - 0 0


Replacement Policies
FIFO
LRU
Random
Write Policies
Write Back
Write Through
Write On Allocate
Write Around
Cache Size (power of 2)
8
Memory Size (power of 2)
64
Offset Bits
0
Reset
Submit
Instruction
Load
(in hex)#
List of next 10 Instructions
Gen. Random
Submit
Information
The cycle has been completed.
Please submit another instructions
Next
Fast Forward
2-WAY SET ASSOCIATIVE CACHE
Instruction Breakdown
0000
11
0
4 bit
2 bit
0 bit
Memory Block
B. 9 W. 0
B. A W. 0
B. B W. 0
B. C W. 0
B. D W. 0
Cache Table
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 1 0 B. 0 W. 0 - 0 0
1 1 2 BLOCK 9 WORD 0 - 0 0
2 1 0 B. 2 W. 0 - 0 0
3 1 0 B. 3 W. 0 - 0 0
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 1 1 BLOCK 4 WORD 0 - 0 0
1 1 5 BLOCK 15 WORD 0 - 0 0
2 1 1 BLOCK 6 WORD 0 - 0 0
3 1 1 BLOCK 7 WORD 0 - 0 0

DIRECT MAPPING


Write Policies
Write Back
Write Through
Write On Allocate
Write Around
Cache Size (power of 2) 8
Memory Size (power of 2) 64
Offset Bits 0
Reset
Submit
Instruction
Load
(in hex)#
0,3,4,1,2,5,7,6,0,3,1,11,5,15,9,4,0,4,3
Gen. Random
Submit
Information
Offset = 0 bits
Index bits = log2(8/1) = 3 bits
Instruction Length = log2(64) = 6 bits
Tag = 6 bits - 0 bits - 3 bits = 3 bits
Block = 3 bits + 3 bits = 6 bits
Next
Fast Forward
Statistics
Hit Rate :
Miss Rate :
List of Previous Instructions :
DIRECT MAPPED CACHE
Instruction Breakdown
TAG
INDEX
OFFSET
3 bit
3 bit
0 bit
Memory Block
B. 0 W. 0
B. 1 W. 0
B. 2 W. 0
B. 3 W. 0
B. 4 W. 0
Cache Table
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 0 - 0 0
1 0 - 0 0
2 0 - 0 0
3 0 - 0 0
4 0 - 0 0
5 0 - 0 0
6 0 - 0 0
7 0 - 0 0


Write Policies
Write Back
Write Through
Write On Allocate
Write Around
Cache Size (power of 2) 8
Memory Size (power of 2) 64
Offset Bits 0
Reset
Submit
Instruction
Load
(in hex)#
List of next 10 Instructions
Gen. Random
Submit
Information
The cycle has been completed.
Please submit another instructions
Next
Fast Forward
DIRECT MAPPED CACHE
Instruction Breakdown
000
011
0
3 bit
3 bit
0 bit
Memory Block
B. 3 W. 0
B. 4 W. 0
B. 5 W. 0
B. 6 W. 0
B. 7 W. 0
Cache Table
Index
Valid
Tag
Data (Hex)
Dirty Bit
0 1 000 BLOCK 0 WORD 0 - 0 0
1 1 001 BLOCK 9 WORD 0 - 0 0
2 1 000 BLOCK 2 WORD 0 - 0 0
3 1 000 BLOCK 3 WORD 0 - 0 0
4 1 000 BLOCK 4 WORD 0 - 0 0
5 1 010 BLOCK 15 WORD 0 - 0 0
6 1 000 BLOCK 6 WORD 0 - 0 0
7 1 000 BLOCK 7 WORD 0 - 0 0



2. Consider 2 way set associative mapping with following design : cache memory is 16bytes and main memory is 256 bytes. The offset bits is 2 . calculate the hit ratio and miss ratio for the following sequence:

3,6,0,8,5,1c,14,15,2,1D,11

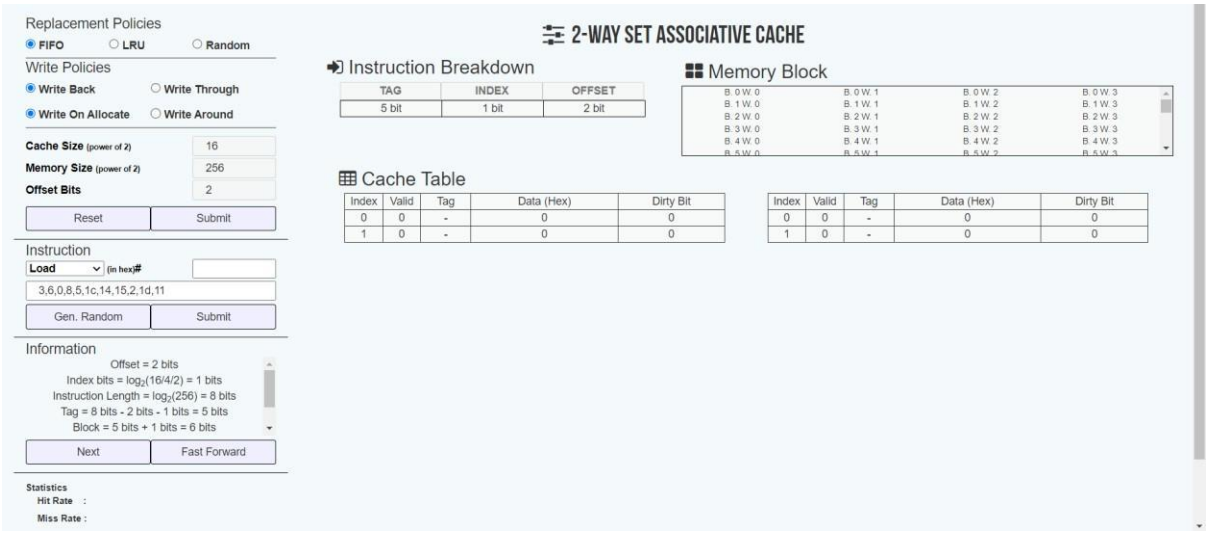
Use LRU and FIFO as replacement policy.

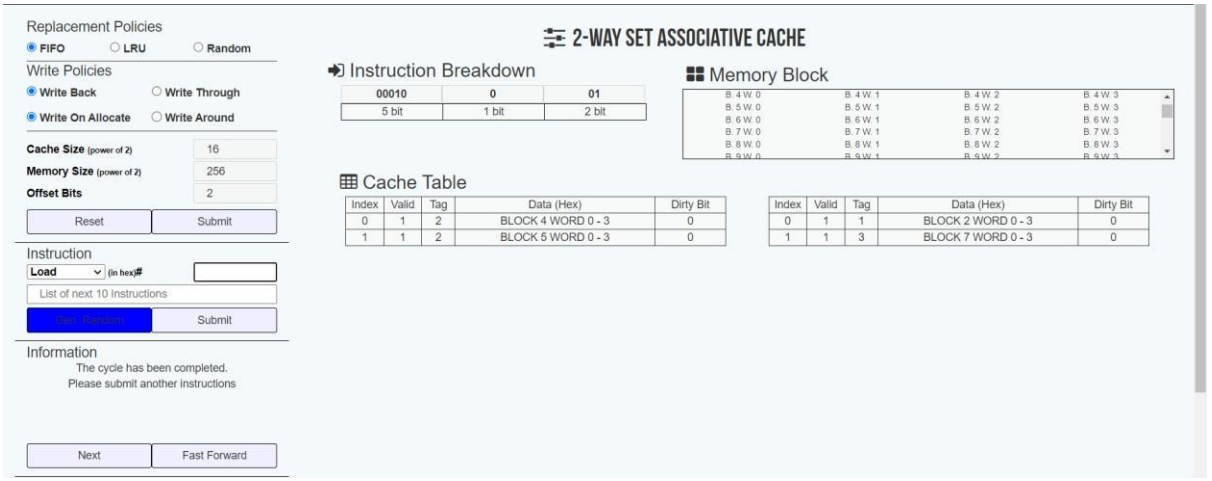
Calculate the hit ratio and miss ratio for the same references using direct mapping.

Suggest which is better mapping technique and justify the same.

ANSWER-

FIFO





Statistics

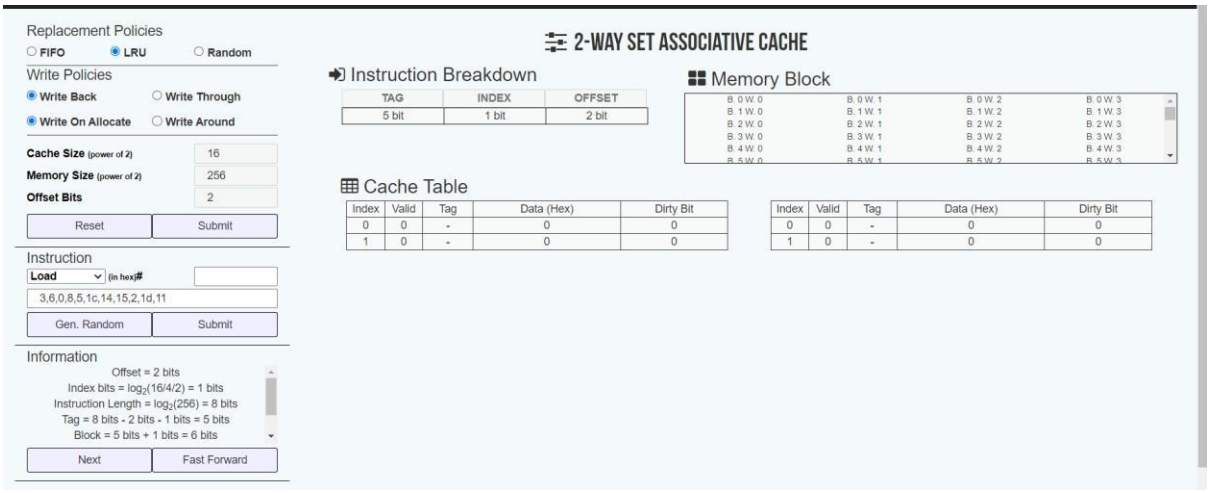
Hit Rate : 45%

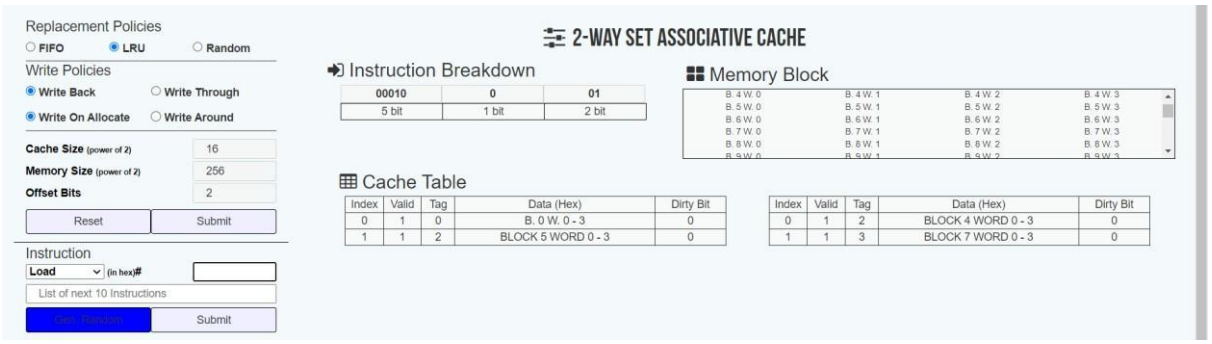
Miss Rate : 55%

List of Previous Instructions :

- **Load 3 [Miss]**
- **Load 6 [Miss]**
- **Load 0 [Hit]**
- **Load 8 [Miss]**
- **Load 5 [Hit]**
- **Load 1C [Miss]**
- **Load 14 [Miss]**
- **Load 15 [Hit]**
- **Load 2 [Hit]**
- **Load 1D [Hit]**
- **Load 11 [Miss]**

LRU





Statistics

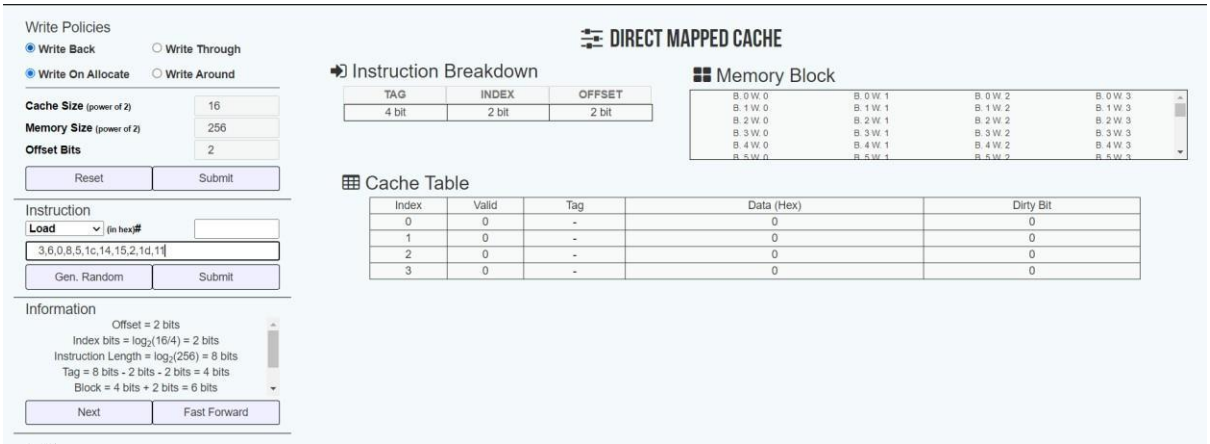
Hit Rate : 45%

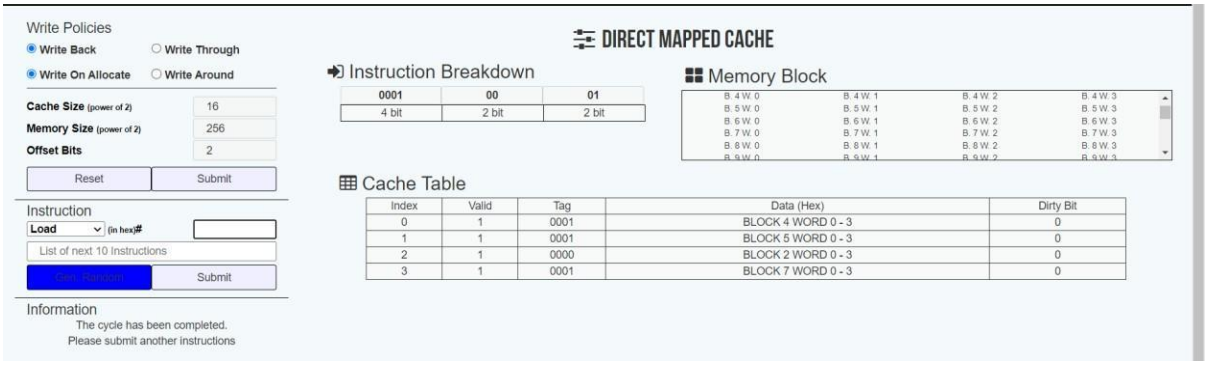
Miss Rate : 55%

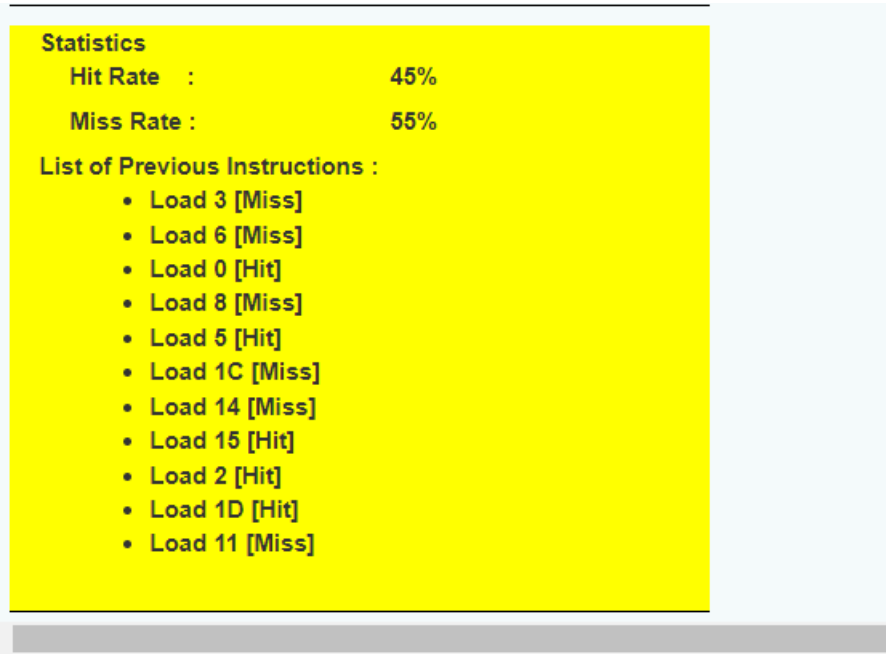
List of Previous Instructions :

- **Load 3 [Miss]**
- **Load 6 [Miss]**
- **Load 0 [Hit]**
- **Load 8 [Miss]**
- **Load 5 [Hit]**
- **Load 1C [Miss]**
- **Load 14 [Miss]**
- **Load 15 [Hit]**
- **Load 2 [Hit]**
- **Load 1D [Hit]**
- **Load 11 [Miss]**

DIRECT MAPPING







BOTH TYPE OF MAPPING ARE EQUALLY EFFICIENT AS THEY BOTH HAVE SAME HIT RATIO.